
Opening Extract from...

Turbulence

A Novel of the Atmosphere

Written by Giles Foden

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It is rescue work, this snatching of vanishing phases of turbulence, disguised in fair words, out of the native obscurity into a light where the struggling forms may be seen, seized upon, endowed with the only possible form of permanence in this world of relative values – the permanence of memory.

JOSEPH CONRAD, 'Henry James, An Appreciation' (1905)

DATE: 22 January 1980
POSITION @ 0600 LOCAL (GMT):
Latitude 54° 26' South, Longitude 3° 24' East
Alongside Bouvet Island
DEPARTED MAWSON STATION: 11 January
NEXT DESTINATION: Cape Town
ETA: 1 February
DISTANCE TO GO: 1277 nm
CURRENT WEATHER: Overcast and cold
SEA STATE: Frozen
WIND: 15 kt Easterly
BAROMETRIC PRESSURE: 975 mb
AIR TEMPERATURE: –1.9°C
SEA TEMPERATURE: –1.5°C

Yesterday, very early in the morning, something unexpected happened. I went up on deck to find the *Habbakuk* covered with a thin mist. Darts of morning sun were lancing through. As I walked along the wooden sheathing, a gigantic phantom rose suddenly out of the sea. I started backwards from a tall figure projected against a wall of ice. The wall was an iceberg – and the phantom, I slowly realised, was my own reflection, enormously enlarged.

I was staring at myself mirrored on the ice, magnified by some trick of the light as it came through the mist. When I moved my arms or legs, the figure on the berg reproduced the same movements, changing its posture as I did. Said joined me, laughing. Soon the whole crew, Arabs and Baluchis, even Schlomborg and the Sheikh were at it. All moving their limbs. All laughing. Ghosts of gaiety. Then, with a hissing noise, the mist burned off and the visions were gone. Such is human life.

Of my own I shall tell only the substantive part. Four years ago I was approached by the associates of an Arab sheikh. He was seeking scientific advice concerning the towing of icebergs to his own country, in order to deliver fresh water to the desert. Using his considerable resources, he had tracked me down as the last surviving individual to have a copy of Pyke's plans for a berg ship.

A few simple calculations told me that it was not a feasible idea to tow a *pure* iceberg to the desert. However, if Pykrete were to be used rather than pure ice, the idea did not seem so

fantastical – no more fantastical, at least, than Pyke's original scheme for the *Habbakuk*, which was formulated in the 1940s. (Pyke's secretary had misspelt the name of the Old Testament prophet used as a codename for the project in Whitehall, and I saw no reason to change it.)

Ninety-nine per cent of all the earth's ice is concentrated in Antarctica – the fringed white veil of the world, the untarnished region. It was the obvious starting point for our venture, since going north from there via the East African coast leads directly to Saudi Arabia, our intended destination. The work was done during the Antarctic summer, between mid-November and the end of January, over three consecutive years.

Among Antarctica's great shimmering floes and black-basalt rocks – they stick out like feet from under the white burnous of the glacier – I watched our bright work grow, littering the virgin scene with lengths of timber, nets of steel trellis, gargoyle-like pumps, macerators, chipping machines.

The visual information of the place was dizzying. So much light. It was as if one was gazing at the world through the eyes of another species – one of the albatrosses that circled forlornly above the site, at one with the whirling cloud and the white fog-smoke. Under this gauze, real ice-bergs floated in a concourse of currents; they looked like tombstones, monoliths, monuments of a world destroyed.

All this was in the open. What remained hidden was my great fear that this grand project, this 'Mammoth Unsinkable Vessel', as Pyke once called it, this veritable white elephant resurrected from a war grave, would melt away before it reached its destination.

But the maths said it wouldn't. However I shook them, kicked them, beat them, the equations stood up.

The ship was built in the Australian claim at Mawson

Station – that is, between the Dismal Mountains and the Amery Ice Shelf. Mawson sits on an isolated outcrop of rock. Its main climatic feature is the katabatic or gravity-fed wind, which results from drainage of cold air down the steep slopes of the ice sheet. Thousands of emperor penguins compete for space with flocks of southern giant petrels, Antarctic fulmars and skuas.

Insulated huts were erected to house the members of the expedition. As we worked, I wondered what some future archaeologist would make of all this, discovering the huts and other equipment under a flour-mound of snow many centuries hence.

The efficiency of the construction was impressive. Many of the crew had worked on desert oil rigs, or in the scrap-metal yards of Sharjah, or been shipwrights in the Gulf, so they were well acquainted with industrial processes. But the cold must have been an intense shock to them and, of course, *Habbakuk* was something unprecedented. Something out of this world – or at least beyond prior human experience.

Apart from wood pulp and ice, our materials were timber, steel girders, sea water and below-zero temperatures. I shall never forget the sight of all those dark faces in white-trimmed fur hoods, or the gloved hands spraying salt water from hoses onto the hull of the growing ice ship, constantly building up its thickness and smoothness. Some of the Pykrete was made naturally, using ice slush skimmed off the surface of the ocean and laid out in huge, forty-foot-square trays into which the pulp was poured. The mixture for smaller blocks was prepared in cement mixers.

It was very hard work for those Baluchis, tough as they were. 'Our limbs are numb,' they complained. The expedition doctor devised a procedure to see how insensitive to cold they had become. It involved successive pricking with a needle

from the ankle or wrist up; 'testing peripheral neuropathy', he said. Something like that. I am afraid to say the Sheikh's ganger treated them no better than the weather. Eight of them died.

We built up the first part of the ship on large timber rafts, using the larger squares of Pykrete (66 per cent ice, 34 per cent woodchip), stacking them up and fusing them together with freezing water just as Pyke had intended all those years ago. The whole was then gradually sheathed in timber and a layer of insulation (a type of mica) pumped into the narrow cavity between the ice hull and its wooden skin.

The chance of my involvement in this tale is just as narrow. The Sheikh had previously sought the advice of Godfroy Wildman-Lushington, a post-war director of British Petroleum and the very man who, as Brigadier Wildman-Lushington, had run the original Habbakuk project in the early 1940s. This time round, the Brigadier suggested Julius Brecher as a suitable chief scientist, but Brecher declined and pointed the Sheikh in my direction. More or less everyone else involved was dead.

I got down to work in my now abandoned rooms at Trinity College in Cambridge, drawing out the plans in ever greater detail. I did so in combination with various bright young sparks from the technical academies of Saudi Arabia, with whom I communicated by the miracle of fax.

One of my major concerns was that the motor nacelles would generate too much heat and begin to melt the structure, but mounting them externally appears to have solved the problem, since water passes over the shell of the nacelle and cools the engine inside. The vessel is steered by the motors on port and starboard, accelerating or decelerating as necessity dictates. There are fifteen nacelles on each side of the ship – we had them made by Westinghouse and shipped out.

I still have Pyke's plans. Enshrined memories, wriggling on

the desk in front of me as I write. Caught in gimballed lamplight, they seem as old as biblical scrolls. I roll out the yellowing volute and read, holding down the edges of the paper with a coffee cup and my tobacco tin.

Sometimes Pyke strayed into the realms of fantasy. He believed that if the Pykrete fleet carried tanks of supercooled water, this could be sprayed onto enemy shipping, whereupon it would freeze instantly and create a bridge for boarding. Or, he dreamed, the gelid water jet could be used to seal up guns. Another of his ideas was to create ice fortresses onshore, freezing explosive booby-traps in their walls which would detonate if any attempt were made to melt them.

But the basic idea behind *Habbakuk* was sound, and when we cruised out of our Antarctic harbour we were as near as possible to reproducing it, taking advantage of whatever new technologies had come along since the war.

On the day we sailed (11 January 1980), scientists from various research stations across Greater Antarctica showed up to wave us off. There were even some Chinese from Zhongshan Station – a helicopter ride across the ice shelf from Mawson – and also some Japanese and Russians. It is a mark of *Habbakuk*'s uniqueness that they all turned out, as the scientists in these different claims are by nature fiercely competitive and secretive.

I remember them standing under the orange glow of the sun amid the sparkling purity of the snow as we slid away. Human figurines with a mass of emperor penguins moving behind. The penguins reminded me of scholars at an academic conference, sipping tea in loose, casual groups during an interval as they waited for the return to seated order of the next plenary session . . .

Oh, how I remember those Cambridge days. McClintock and Summerhayes, Yazikov and Lewis, vying to be editor of

the *Journal of Fluid Mechanics*. The abjects who gathered themselves against me, returned in just one puff of my pipe. Better another: if only *she* could return to me like that for real.

The ship was cheered, the harbour cleared of balaclavas, bright-hued survival suits, sunglasses. Of flesh and blood only the penguins stayed. Behind them stood the sheds and hangars of Mawson, backed up by lines of sastrugi: ribbed rows of frozen, gale-borne snow, all aligned with the direction of the wind. All as straight as we are on our course to the desert, though the water twirls round us like dancers on a stage.

That twirl involves turbulence, the last great problem in classical physics. As Einstein is supposed to have put it: 'Before I die, I hope someone will clarify quantum physics for me. After I die, I hope God will explain turbulence to me.' (Another version of this story, which is also ascribed to Heisenberg and von Kármán, has the speaker adding: 'But I wouldn't want to embarrass God by asking him.')

With Schlomborg at the wheel – really a series of buttons and knobs controlling the nacelles – we have reached Bouvet Island, an uninhabited pile of rocks, gravel and glacier where we are replenishing our ice supplies. Bouvetøya, as the Norwegians call it – Norway has dominion over this desolate spot – is said to be the remotest place on earth, i.e. furthest away from any other land.

As I write, chinstrap penguins are diving for krill outside the porthole. The island is also home to thousands of vast elephant seals, which kill the penguins by shaking them inside out.

From here we will set a northward course to Cape Town, where supplies will be taken on board, as again at Dar es Salaam in Tanzania. We will then continue along the Kenyan and Somali coasts up to the Arabian Gulf.

Schlomborg wears the full brass-buttoned, navy-blue uniform of the Swedish merchant marine. He seems to be

unaware that the ship he captains is made of ice, affecting a weird indifference whenever I bring up the issue of the vessel's structural integrity, the guardianship of which is my main purpose on board. But he plays the nacelle steering panel like a first-class organist.

The fellow who paid for it all, Sheikh Issa, is a dark little man with eyes full of fierce determination. He wears a billowy white robe. I presume he must have woollen long johns underneath, as it is bitterly cold in the Southern Ocean. The wind sweeps down the length of a ship like an animal trying to fasten on its prey. Now and then some small discrete item, such as someone's boot or hat, is gripped by this great wind and lashed along the deck. By the time it reaches the stern it is out of sight and the thought filling your head as you lean into the blast is that you too could be punched and slapped along the deck like that before being blown off clear.

Into an immense anonymity of foaming waves.

Rollend in schäumenden Wellen.

Rolling in foaming billows, as the aria which narrates the making of seas and rivers in Haydn's *Creation* puts it.

There are about twenty officers on board, mainly young Arab engineers and cadets from the Saudi naval school. No women. For all that, the young Arabs on the ship are obsessed with a heartbreaker called Olivia Newton John. I have seen posters of her on the doors of their cabins.

There is a fitness centre, a library and a small cinema on the ship, playing mostly old films. *The Searchers*, *The African Queen*, *Gone with the Wind*. Seeing the last again made me think of Krick.

There is also a little mosque, its minaret competing for verticality with radar apparatus and radio aerial. All is otherwise much as Pyke imagined it, except that rather than the hull being full of planes, as he'd envisioned, it contains very large

tanks of supercooled water. This water, as well as the structure of the ship itself, is our cargo for the desert. The plan on arrival is that the supercooled water will be drawn off by pump. Then we will go into dry dock, suspended over mesh and more tanks. The structural ice will be allowed to melt naturally into the tanks, with the fibre in the Pykrete being sieved out by the mesh.

Grease ice, pancake ice, sea-ice sheet, ice floe – we have already fallen in with every kind of ice and through all of it the disgraced Swedish merchant captain has sailed as if born to the task. There is something a bit doltish about him, with his vast bulk and red monarchical beard, but I can't fault his navigation. He seems very tranquil up on the bridge, issuing orders to Said and his other officers. The only thing that has upset him was the appearance beside the ship one day – it was during lunch – of a sperm whale, but I think that was simply because he wanted to finish his meal. Garlanded with phosphoric radiance, the beast moved alongside us for an hour or two. Or rather, it was as if we were moving alongside an illuminated, saucepan-grey promontory – some piece of lonely land, like this Bouvet Island we're moored off, but stretching into the sea with a necklace of light.

Said is the Sheikh's son. He likes to falcon off the deck, hoping to catch other birds. Mostly young skuas which put up a good fight. Handsome and clever, with an aquiline nose, he has become a particular friend. One day, coming into my cabin and seeing before me this blotted memoir of my wartime days, this other vessel on which I've embarked to pass the time at sea, he asked, 'What are you writing?'

I told him what, and showed him some, and also pages of the dog-eared diary from which I'm working up the book. And so the custom has begun of him taking and reading the successive chapters as I finish them each day, progressing in that

story as, looming out of frozen mists, the *Habbakuk* makes its way north. I drink tea or whisky, smoke my pipe, listen to cassettes of Haydn oratorios – and write. Now and then I am called upon to give judgement on a scientific issue relating to the ship but otherwise my time is my own.

Sometimes I overdo it, for an old man. One morning Said found me asleep in bed – among my papers, with manuscript sheets scattered around me. The top of my fountain pen had come off in my lap. The ink had run into the bedsheets, turning their cryptic creases as blue as the ocean through which we are sailing.

This happened, that happened . . . The question of where to begin is always hardest. A deep breath is needed before making that decision. For, as Ryman himself said – *all mistakes proceed from initial conditions*. In the end I chose not my birth or childhood but another journey, undertaken many years ago, when as a callow youth I made my own way north, to see the Prophet.

January

1

The Prophet was a scientist called Wallace Ryman. He was a conscientious objector who devised a special 'number' in which the government was interested during the Second World War. Many great scientists have had a number named after them, usually defining the state of a particular physical process. The Mach number, which expresses the speed of an object moving through air divided by the speed of sound, is the one with which most people are familiar.

The Ryman number, by contrast, is a criterion by which the turbulence of weather systems and other flows can be measured. It is dimensionless, which means it can be applied anywhere as a co-ordinate of comparison across space and time. A low Ryman number (less than one) indicates significant turbulence; a higher score (above one) indicates a more typical, 'stable' state.

These dimensionless numbers are all about information. They are used as a way of gauging information received. There has been an occasion in my life when (to cut a long and complicated story short) I think I may have had some significant historical influence in employing the Ryman number in this way. The context of this was the meteorological preparations for Operation Neptune in 1944, the first phase of Overlord – or, more popularly, D-Day.

In winter that year I was sent on a special task by Sir Peter Vaward, director of the Meteorological Office. From its reluctant originator I was to discover how to apply a range of values of the Ryman number to a fifty-mile-long invasion site on the

coast of France or Belgium. The Ryman number has a direct effect on weather forecasts, because turbulence is associated with patterns of expectation and uncertainty.

Ryman lived in Scotland. Sir Peter had organised a place for me on a meteorological reconnaissance plane on its way from London to Prestwick, which then served the city of Glasgow and the large volume of air traffic arriving from America. It was late January when I set off, and snow was blowing across the airfield as I made my way to the plane (a Halifax), whose propellers were already turning.

In the absence of meteorological information in areas where the enemy operated, a large number of these reconnaissance flights flew daily on sorties all round the British Isles. The plane I was flying in was due to continue from Prestwick to Stornoway on the Isle of Lewis, from where it would fly on the BISMUTH sortie towards Iceland. The aircraft was part of Met 518 Squadron and carried their famous badge painted on its nose – a fist grasping a key with *Thaan iuchair againn-ne* written underneath, which is Gaelic for 'We hold the key'.

What did I think was going to happen, as I climbed into the cabin with my suitcase? Did I have a sense of knowledge about to dawn? What did I *feel*? It's very hard to get back to all that. It doesn't just come gushing out. I often didn't know what I felt at the time; I often don't know what I think now. So many of our deepest feelings, in any case, come to us as doubtful, tangled, compound experiences. Events themselves as they happen condition the way we see previous events, making us recalibrate the chain of causation even as we teeter along it, casting all the while a speculative eye at a web of possible futures . . . This is what living – conscious living – is.

As we took off at around ten I could still taste the baked beans I'd had for breakfast. No doubt about that, even after so many years. I remember the old advertisements, too, with their

'Always ready to serve' slogan (more patriotic in those troubled times than '57 varieties', I suppose) and picture of a soldier eating. And then: *Don't think Heinz are making less. We are making more! Fighting men must be fed first; so civilian supplies are limited. But those with a quick eye for the famous name . . .*

Something like that.

I sat up front. The cockpit was cold and draughty. Like the pilot, I had a throat mike and a flying helmet with earphones and goggles – through which, once we were underway, I watched the blizzard increase. The snow hit the glass in loosely defined units, then moved across it fast in a joining mass before being whipped off to the wingtips, where it whirled round like a thick vapour and was flung into our trail. It was in my nature to plot the journey of each snowflake in my head: p = the pressure, h = the height, x = the mass of water per unit mass, v = the velocity per unit mass, y = the entropy . . .

'You want to avoid cumulonimbus,' I said to the pilot, after a while watching the snow clouds. 'Very bad for turbulence.'

'To the deuce with that,' he said, pushing the joystick. We went into a sharp dive. The plane began to spin, a phenomenon at first oddly lacking in turbulence, since it was controlled. Nonetheless, it was terrifying.

I knew that if there was a 'wobble' severe turbulence would soon occur and we could lose control of the plane. I had done experiments on this sort of thing while at Cambridge – throwing boomerangs on the Backs and seeing when they would lose aerodynamism, or spinning beach pebbles on wooden surfaces and judging when they would fall.

We continued to drop. A penetrating noise sounded through the riveted aluminium of the cabin. 'What the hell are you doing?' I shouted.

We were still heading down, diving through one cloud layer after another, the engine roaring – 6,000 feet, 5,000, 4,000 . . .

'Are *you* telling *me* how to fly?' came the reply through the headphones. 'I've been flying cunims since you were in short trousers. This is nothing! I've flown in weather in which even the birds were walking.'

I clutched my seat, feeling the beans and bacon rise in my stomach. 'That may be so,' I said, 'but . . .' My voice dried up as wordless terror filled my bones.

He stamped on the pedals and pulled out the throttle to full. The nose was still pointing down. I looked at the altimeter in horror. The engine screamed as aero-fuel shot into it – and then in another swift movement he centralised the joystick.

Suddenly we were upright and calm. The needle began to creep round the dial – 2,000 . . . 3,000 . . . 4,000 . . . then he flattened out, allowing the instruments to acquire level values for a minute or two, before starting to climb again steadily.

'What did you do that for?' I said angrily as we regained height. 'Is that your idea of a joke?' With the increase in height came a faint feeling of my intestines being squeezed.

The pilot laughed. 'Simmer down, old chap. I was doing a thumb.'

'A thumb?' I asked, my heart still racing. Something familiar rubbed at the back of my mind. Not 'thumb' – THUM: Temperature and Humidity. The manoeuvre was a legitimate one to record those values at successive heights. But there was no need to do THUMs over the English Midlands.

I spent most of the rest of the journey in sullen silence, staring into the oncoming snow. There was not much I could do. The joker was a Lieutenant Geoffrey Reynolds, who proceeded to tell me about a noteworthy engagement in which he had become involved. Flying back from his sortie he had spotted a U-boat on the surface. The U-boat crash-dived on seeing him but Reynolds attacked with two anti-submarine bombs that exploded just ahead of the wake . . .

'The U-boat was virtually blown out of the water, rearing up stern first before sinking. I was bloody chuffed with myself, I can tell you, and headquarters were pretty pleased, too.'

I imagined the U-boat sinking in a widening slick of bubbles and oil and flotsam. 'They wouldn't have been quite so happy if the U-boat had had time to call in air support,' continued Reynolds. 'Mind you, nothing's so hairy as picking up damaged instruments from weather ships. The crews sling them out in a waterproof bag on a line attached to a buoy, and we have to fly down and pick up the line with a hook lowered from the undercarriage. Then come round again and throw the new gauges down to the crew. You don't want Jerry creeping up on you in the midst of that malarkey. It seems a lot of trouble to go to for a broken barometer. I don't really understand why they don't just throw the bust ones over the side rather than have us haul them back to be repaired.'

The reason was that these instruments were very expensive and hard to make, but one couldn't expect an airman to appreciate that. There was often a bit of friction between these pilots and us forecasters, especially on the more remote bases. The pilots depended on us for good information, and they could often be very rude when they didn't get it, or a forecast went wrong. The issue of authority was complicated by the fact that some forecasters wore RAF uniform and some didn't, depending on the type of operation in which they were involved.

I had just been promoted to technical officer, but that was a Met rank, not an RAF one. Just the previous week, prior to Sir Peter's intervention in my life, I had been a lowly meteorological assistant, a plotter of synoptic charts, a sender up of balloons on £110 a year (£6 income tax).

Mine was an odd way into meteorology, as few practical meteorologists have also been academics. I had been in the Cavendish Laboratory at Cambridge, and I got there at an

early age. I was awarded my PhD in 1938, at which time I was twenty-two years old. My thesis was in fluid dynamics, focusing on turbulence and other complexities of flows or 'dynamical systems'. One encounters a lot of these in continuum physics – it's all the stuff that's shifting around, the material that's hard to quantify because it's always moving.

In the absence of any particular girlfriend, I'd fallen in love with turbulence while an undergraduate. It is really just the study of whirls and eddies, in particular those that make up, on different scales, the atmosphere in which we all live. Fluid dynamics is also keyholder of our lives in a more intimate way, in that it governs the flow of blood and chemicals through the locks and weirs of body and brain.

I listened to the hum of air passing softly over the machine, blowing past the wings in a whine that was clearly audible despite the *whoof-whoof-whoof* of the engines. Out of an intense, blue-gleaming whiteness, snowflakes whirled up from the nose. Now and then through the endlessly changing air we fell into patches of larger alteration. Troughs of turbulence, like potholes in a street in an African town – such as where, from under the dirt-stiffened pleat of his shirt, a beggar might reach out a hand for coins.

Those are all the people I have time for now, since G— is gone, those millions of Africa for whom Overlord meant nothing, to whom the generals then and nearly every politician since cast hardly a glance.

G—. I cannot even write the name. Even thinking it causes a sharp, tender shock to spike into my heart.

Flying north, I watched the white flakes spattering the screen. Their shapes, distinct only for a moment, commingled with the thread-like wisps of my thoughts as they came and went. It was as if both were being blown by a wind that would permit no stillness. Everything was swelling, dispersing,

happening again and yet not again – for while each thought and each snowflake was different and had its own identity, each was being carried along in the same medium of incalculable change.

War – that altered everything too. The cosy Cambridge world of teacakes and sporting the oak began to disintegrate, chipped away in fragments. One could not just stay at one's bench in the lab. I saw an advertisement for a training post at the Meteorological Office and, wanting to serve my country in the best way I could, I applied for the job.

On being accepted I was sent to the Central Forecasting Unit at Dunstable. There I studied under Charles Douglas, the senior forecaster. He was an eccentric man but a kind one, and a brilliant meteorologist. He had a phenomenal memory – and some kind of nervous affliction. Something terrible had happened to him during the first war: he was a meteorological observer with the Royal Flying Corps and had been shot down in a dogfight. I once saw him get up in the middle of a meeting and run three times round the table.

But Douglas gave me the best on-the-job training anyone could have got. By 1943 I was research assistant to the superintendent of Kew Observatory, James Stagg, and owner of a small flat in Richmond, having scraped together enough to buy it from savings and the little money that came to me from my parents. Stagg and I worked together on various issues relating to the reflectivity of clouds. Like me, he would be plucked out of his post when the planning for D-Day began.

As we came into Prestwick, I saw that the braziers were out, lines of petrol burners on either side of the runway to aid visibility. And I must say that Reynolds, despite his chirpy offensiveness, made a good job of landing in such difficult conditions.

More snow arrived as we taxied over to the hangar – a blinding wall of wind-driven particles rising like smoke from the ground. As the wind blew, it took the loose new stuff with it, making it slide across the hard, crusted snow that had been compacted by vehicles on the surface of the airfield.

I said thank you and goodbye to Reynolds before disembarking and he grinned at me as he undid his helmet strap, so I suppose we parted on good terms in the end.

I climbed down the ladder, grateful for my Crombie and leather gloves, but very much feeling the lack of a hat as the snowflakes settled on my hair. Still, it might have been cold but I was at the start of my adventure; and besides, for me, unlike most travellers, the snow was a source of great delight. Tumbling softly or flying past fast in a jet, it made the wind visible in all its varieties – for these streams of snow passing over the trodden surface were not regular in scale: some were broad, some narrow; some ran straight, some crooked. Some stopped and flew up into the air, as if in a column. Others were clamped down, as if struck with a hammer. Sometimes these streams, which were often no more than two yards broad, acted as a kind of fence, disclosing the variable action of two other drifts of snow on either side.

Most marvellous of all were those moments when two of these corridors of snow, blown by wind coming from different directions – north and west, say – met and passed through each other, like ghosts at a crossroads.

Now I remember this image I'm struck by its significance; for it was exactly this idea of corridors and barriers, of differential borders marking out the richness and variety of weather, that I would learn from Ryman. My master, so fine and subtle, who knew things perfectly at which I could only grope, reaching for years in Cambridge the skinny hand of thought into the darkness.

Despite the dampening effect of the snow, the braziers made quite a noise, roaring yellow-blue plumes of flame into the frozen air. I noticed an American military plane on the white-shrouded tarmac, and it was an American I first spoke to on entering the airport complex. He was dressed in a USAAF leather flying jacket and cut quite a figure, being rather tall, with a scrap of thick black hair falling over his forehead.

'This will all be gone by morning,' said the man, looking out at the gale. 'It'll be like it never happened.'

As I was to discover, such optimism of prediction was entirely typical of him. Personally, I don't think he was the self-serving scoundrel some European observers have made him out to be. He just wanted the best for the world he was part of.

'I think you'll find any forecast over three days hence is purely random,' I said. 'Beyond two it's little better than gambling.'

'Oh yeah?' he said, pushing back the shock of hair. 'And who are you to say so?'

'Henry Meadows,' I said, trying not to assume an air of superiority. 'I work for the Met Office, actually.'

He laughed. 'Holy Moly, what a coincidence.' He held out his hand. 'Irv Krick. US Air Force weather service. I'm here on a familiarisation tour. What's your business?'

I gave him the alibi with which Sir Peter had supplied me. 'I'm on my way to set up a weather station in the west of Scotland.'

I'd vaguely heard of Krick – he used to work at Caltech, which in those days led the way in American meteorology – and we talked a little about developments in the field. He was on his way home to the United States, but his plane had been grounded. He went to consult his colleagues about the chances of leaving the following day and I turned to watch the storm through the plate-glass window. How was I going to get to

Kilmun in this weather? I was supposed to be taking a steamer out to the west coast in a few hours, but that would be impossible now.

I heard Krick's voice behind me. 'Me and my buddies are going to hole up in a hotel in Glasgow tonight. If you play poker, we'll give you a game.'

I considered my limited options. At the very least I needed lunch, so I joined Krick and his assistant Ben Holzman in a military car which took us through the blizzard to a hotel in the centre of the city. The journey was about thirty miles and it snowed the entire length of it.